

REMARKS

The Office Action of September 20, 2004 has been received and its contents reviewed. By this Amendment, claims 1, 3, 7, and 9 are amended. Thus, claims 1-11 are pending in this application. In view of the following remarks, reconsideration and allowance of the application is respectfully requested.

Claim Rejections under 35 U.S.C. § 112, second paragraph

The Office has rejected claims 1-11 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In particular, the Office asserts that the claims are structurally indefinite, as it is unclear how are the polyimide substrate, the subbing metal layer (i.e. the Mo-Ni alloy layer), a plated electro-conductive film, and a copper metal layer are related in position. However, claim 1 as amended recites “an electro-conductive metal plated polyimide substrate comprising an aromatic polyimide substrate, a subbing metal layer of Mo-Ni alloy comprising molybdenum and nickel in a weight ratio of 75/25 to 99/1 formed over said substrate, and a plated electro-conductive metal film, formed over said subbing metal layer”, which Applicants believe more clearly define the structural relationship between the layers.

Furthermore, the Office asserts that the language in claims 3 and 7 is not consistent. In particular, the Office points out that claim 7 recites an “aromatic polyimide film” while claim 1 recites an “aromatic polyimide substrate”. In addition, the Office points out that claim 3 recites an “electro-conductive metal” while claim 1 recites as “electro-conductive film”. However, claim 7 as amended recites an “aromatic polyimide substrate” and claim 3 as amended recites an “electro-conductive metal film,” which are consistent with claim 1.

Moreover, the Office asserts that claim 10 is structurally indefinite. However, claim 1 as amended clearly defines the structural relationship between the layers, including the sputtered copper metal layer of claim 10.

Accordingly, Applicants submit that claims 1-11 are not indefinite under 35 U.S.C. § 112, second paragraph, and respectfully request that these rejections be reconsidered and withdrawn.

Claim Rejections under 35 USC § 103(a)

The Office has rejected claims 1-11 under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. (US 6,596,968) or Yamamoto et al. (US 6,548,180). In this regard, the Office has interpreted the present invention as an electro-conductive metal plated polyimide substrate comprised of an aromatic polyimide layer, a Mo-Ni subbing layer, a sputtered copper layer and a copper layer; all in the named order.

With respect to the references, the Office asserts that Yamamoto '968 discloses a polyimide film laminate comprised of an aromatic polyimide film and a metal film, wherein the aromatic polyimide film is comprised of a high T_g aromatic polyimide film and two low T_g aromatic polyimide layer on both surfaces of the high T_g aromatic polyimide film, the metal film is laminated onto the low T_g aromatic polyimide layer (col 2 L 39-51 & Figs. 3 & 4), and the aromatic polyimide film is formed from a biphenyltetracarboxylic acid compound and a p-phenylenediamine (col 4 L 18-20). The Office further asserts that the metal films may comprised of a subbing layer such can be nickel or molybdenum, having a thickness of less than 1 μm , a copper layer is then plated over the subbing layer (col 7 L 34-40), and the metal films comprised of the subbing layer and the copper films, has a thickness of from 3-12 μm (col 3 L 44-48).

In addition, the Office asserts that Yamamoto '180 discloses an aromatic polyimide film laminate comprised of an aromatic polyimide film and a metal film, wherein the aromatic polyimide film is comprised of a biphenyltetracarboxylic acid component and a p-phenylenediamine component (col 3 L 23-27), an adhesive layer may be placed onto the aromatic polyimide film before the metal film deposited (col 3 L 55-58 & col 6 L 44-45), the adhesive can be a polyimide adhesive (col 6 L 15), the metal film can be of two or more metal layers with the lower metal layer (or subbing layer) be molybdenum, nickel or their alloys and the upper metal layer being copper (col 6 L 57-63), and the metal film has a thickness of 1-20 μm (col 6 L 64-67).

The Office also states that the two references are silent about the composition of the subbing layer. However, the Office asserts that it would have been obvious that any composition of molybdenum and nickel would perform the same job because both references

disclose that either one of Mo and Ni alone of their alloy could be the subbing layer, thus combining two of them in a workable ratio is within routine experimentation.

Claim 1 recites an electro-conductive metal plated polyimide substrate comprising an aromatic polyimide substrate, a subbing metal layer of Mo-Ni alloy comprising molybdenum and nickel in a weight ratio of 75/25 to 99/1 formed over said substrate, and a plated electro-conductive metal film, formed over said subbing metal layer.

Contrary to the stated position of the Office, Applicants submit that the specific composition of the subbing metal layer of Mo-Ni alloy comprising molybdenum and nickel in a weight ratio of 75/25 to 99/1 is not a “workable ratio” within a “routine experimentation”. First, Yamamoto '968 is silent about any alloy of the disclosed metals except copper alloy. Accordingly, Yamamoto '968 neither teach nor suggest that a Mo-Ni alloy can be employed as the material of the subbing layer. Second, Yamamoto '180 describes a number of metal elements such as Cr, Ti, Pd, Zn, Mo, Ni, Co, Zr, Fe and their metal alloys. There is no teaching that a metal alloy of specifically selected combination, that is, the Mo-Ni alloy recited in claim 1, can be most advantageously employed. Further, claim 1 clearly requires that the Mo-Ni of the subbing layer is molybdenum rich under the condition of Mo/Ni in the range of 75/25 to 99/1. There is given no teaching whatsoever on the specific Mo/Ni composition in Yamamoto '180.


In addition, Applicants would like to direct the Examiner's attention to the working examples set forth in the specification of the present application, particularly, Tables 1 to 4 on pages 16-18. The copper film-plated polyimide substrates of Examples 1 to 6 satisfy the requirements of the claimed invention. The copper-plated polyimide substrate of Comparison Example 1 employs Mo only for producing the subbing layer. The copper-plated polyimide substrate of Comparison Example 2 employs Cr-Ni alloy for producing the subbing layer. The copper-plated polyimide substrate of Comparison Example 3 employs Mo-Ni alloy of the composition of 50/50 (Mo/Ni) for producing the subbing layer. Table 1 indicates that the copper-plated polyimide substrate of Comparison Example 2 shows a poor surface insulation resistance to FeCl₂ solution and CuCl₂ solution after forming electrode pattern thereon. (See the description of Measurement-1 on page 12). Tables 2 and 3 indicate that the copper-plated polyimide substrate of Comparison Example 1 shows low etching rates when the subbing layer is etched with FeCl₂ solution or CuCl₂ solution. Table 4 indicates that the copper-plated

polyimide substrate of Comparison Example 1 shows an extremely poor resistance to alkaline solution. In the manufacture of the copper-plated polyimide substrate of Comparison Example 3, no good subbing layer was formed due to magnetism of Mo/Ni.

Neither of Yamamoto '968 and Yamamoto '180, taken alone or in combination, teach or suggest the use of an Mo-Ni alloy for the preparation of the subbing layer and the surprisingly beneficial effect of the molybdenum-rich Mo-Ni recited in claim 1 for the use of the subbing layer. Accordingly, Applicants submit that claim 1 is not unpatentable under 35 U.S.C. § 103(a) over Yamamoto '968 and Yamamoto '180. Thus, Applicants respectfully request that the rejection of claim 1 under 35 U.S.C. § 103(a) be reconsidered and withdrawn. Since claims 2-11 depend from and contain the limitations of claim 1, they are distinguishable over the cited references and patentable in the same manner as claim 1.

In view of the amendments and arguments set forth above, Applicants respectfully request reconsideration and withdrawal of all the pending rejections. While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise which could be eliminated through discussions with Applicants' representative, then the Examiner is invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Respectfully submitted,


Donald R. Studebaker
Registration No. 32,815

DRS/SMH

NIXON PEABODY LLP
Suite 900, 401 9th Street, N.W.
Washington, D.C. 20004-2128
(202) 585-8000